

Tall Mass Timber Buildings

BUILT IT TALL. BUILD IT SAFE.



The exceptional strength and efficiency of mass timber construction has been well documented for generations. Massive wood structural elements, combined with solid wood floor assemblies, create structures that are strong and fire safe. Mass timber buildings are easier to construct than other buildings and offer energy savings not found in traditional steel and concrete buildings.

The greater availability of mass timber technology has spurred a new generation of taller mass timber buildings. Examples from across Europe and North America have proven the efficiency, cost effectiveness and safety of this type of construction.

Mass timber systems are quite different from traditional dimension lumber. Unlike stick-built structures, mass timber buildings are built with large pre-manufactured panels for floor, wall and roof assemblies. These components, including Cross-Laminated Timber (CLT), Nail-Laminated Timber (NLT), Dowel-Laminated Timber (DLT), Glued-Laminated Timber (Glulam), and Structural Composite Lumber (SCL), offer distinctive benefits:

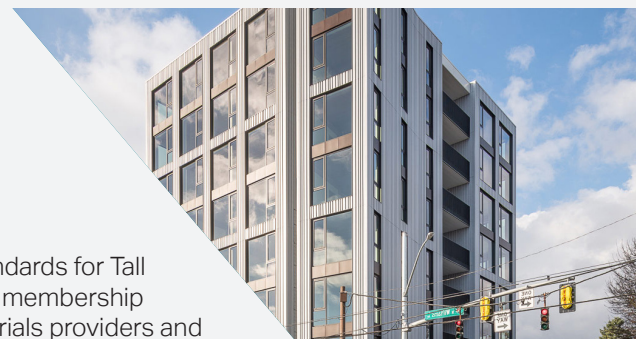
- » The resilience of mass timber panels offers the strength of steel with lower weight;
- » Mass timber is manufactured from a renewable resource that uses the sun's energy to sequester greenhouse gasses and is manufactured at much lower energy intensity than other materials;
- » Mass timber buildings offer design options and precise building envelopes that significantly reduce energy consumption;
- » Mass timber panels and components can be installed by a diverse labor force, more easily, less disruptive to neighbors, and in less time than other construction methods;
- » Mass timber is inherently fire resistant because a layer of charring in a fire event protects the inner structure of the panel.

The *International Code Council (ICC)* Ad Hoc Committee on Tall Wood Buildings has recommended code proposals to ensure that the 2021 International Building Code remains relevant and provides local officials with the tools they need to ensure future mass timber buildings meet the highest standards. The Committee's work was aided by multiple fire performance tests on mass timber structures conducted at the federal Alcohol, Tobacco, Firearms and Explosives (ATF) Fire Research Laboratory, the world's largest fire investigations lab. The fire tests confirmed that mass timber structures meet and generally exceed the fire resistance requirements in the current code.

ABOUT THE MASS TIMBER COALITION

The Mass Timber Code Coalition's (MTCC) mission is to provide complete information on the 14 code proposals recommended by the ICC's Ad Hoc Committee on Tall Wood Buildings.

The Committee's comprehensive set of requirements will ensure the highest standards for Tall Mass Timber Buildings and will keep the *International Building Code* relevant. Our membership includes building officials, architects, engineers, former fire service officials, materials providers and construction industry participants.



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Mass Timber Code Coalition

The Facts

ABOUT MASS TIMBER AND ITS INHERENT BENEFITS IN TALL BUILDING CONSTRUCTION

A combination of fire resistance, structural integrity and environmental attributes make new tall wood buildings among the most innovative structures in the world. Here are the facts about mass timber:

MASS TIMBER IS FIRE RESISTANT



During a fire resistance test of a 5-ply cross-laminated timber (CLT) panel wall, the panel was subjected to temperatures exceeding 1,800 Fahrenheit and lasted **3 hours and 6 minutes**, far more than the two-hour rating that building codes require.¹

During fires, exposed mass timber chars on the outside, which forms an insulating layer protecting interior wood from damage. Additionally, when the code requires mass timber to be protected with gypsum wall board, the mass timber can achieve nearly damage-free performance during a contents-fire burnout event.²

MASS TIMBER IS SUSTAINABLE

Replacing steel with mass timber would reduce carbon dioxide emissions by between **15% and 20%**.⁴ By some estimates, the near term use of CLT and other emerging wood technologies in buildings 7-15 stories could have the same emissions control effect as taking more than 2 million cars off the road for one year.⁵

The fire tests confirmed that mass timber structures meet and generally exceed the fire resistance requirements in the current code. Studies have shown that building with wood produces fewer greenhouse gas emissions than building with other materials.⁶

MASS TIMBER MAKES CONSTRUCTION COST-EFFICIENT

Mass timber buildings are roughly



faster to construct than concrete buildings⁷ and require



less

Since mass timber panels are prefabricated and then assembled on site, buildings made from mass timber have much shorter project timelines and safer construction sites.

CITATIONS

1. <http://www.awc.org/pdf/education/des/ReThinkMag-DES610A-MassTimberinNorthAmerica-161031.pdf>
2. https://www.fpl.fs.fed.us/documents/pdf2016/fpl_2016_pei001.pdf
3. http://www.architectmagazine.com/technology/t3-becomes-the-first-modern-tall-wood-building-in-the-us_o
4. <http://www.sciencemag.org/news/2016/09/would-you-live-wooden-skyscraper>

5. <https://www.usda.gov/media/blog/2014/10/10/announcing-us-tall-wood-building-prize-competition-innovate-building>
6. <https://www.tandfonline.com/doi/abs/10.1080/10549811.2013.839386>
7. <http://www.awc.org/pdf/education/des/ReThinkMag-DES610A-MassTimberinNorthAmerica-161031.pdf>
8. <http://www.awc.org/pdf/education/des/ReThinkMag-DES610A-MassTimberinNorthAmerica-161031.pdf>

MASS TIMBER IS STRONG



Recent mass timber buildings weigh approximately **1/5th that of comparable concrete buildings³**, which in turn reduces their foundation size, inertial seismic forces and embodied energy.

High strength-to-weight ratios enable mass timber to perform well during seismic activity.

